Section of Proctology

President Ian Todd MS

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Short Papers

Late Repair of Injuries of the Anal Sphincter

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The commonest cause of anal sphincter damage is childbirth injury. It is dealt with competently by gynæcologists and the results are generally good. The site is always the anterior midline.

Damage to the external anal sphincter muscles at sites other than the midline are not so easily treated. Blaisdell (1940) reviewed a large number of attempted repairs and reported almost uniform failure. Goligher (1967) expressed the view that such repairs are difficult if not impracticable, the retracted ends being difficult to define with confidence, and any sutures placed in them tending to cut out.

The present report describes 20 patients with sphincter damage sufficient to cause appreciable loss of anorectal control. In most cases the section of the muscles was total, but in some there was some fibrous tissue joining the widely separated ends. This group of patients can be broken down into distinct categories: (1) Lateral or posterior muscle section due to fistula operation (11 cases) or direct trauma (1 case). (2) Anterior injuries, which can be further subdivided as follows: (*a*) due to childbirth injury but unrelieved by several attempts at repair by the standard gynæcological procedures (4 cases); (*b*) due to automobile injuries (3 cases) – this type of injury is probably a disruption rather than direct trauma; and (*c*) due to fistula surgery (1 case).

Operation

The technique of repair was similar in all cases. The first patient (Group 1) treated refused a temporary colostomy; the repair broke down and the result was a complete failure. This undoubtedly biassed the management of the subsequent patients as almost all have been given temporary colostomies. One other patient, who had had a Crohn's fistula, also refused a temporary diversion, and here again the result was poor. One patient among the more recent cases was given a synthetic diet for ten days without a covering colostomy. Here the result was good and possibly this method will obviate the need for temporary diversion. At this stage, however, one can only counsel caution.

The principle of operative repair is simple: to recreate a long anal canal with a sphincteric mechanism as near normal as possible. It is not enough to get part of the sphincter together; it is highly desirable that the whole length should be repaired.

The first step is to excise all the secondary epithelium and underlying scar tissue (Figs 1 & 2). This creates a rather large wound, but is essential before the muscle ends can be opposed without tension. The next step is to mobilize

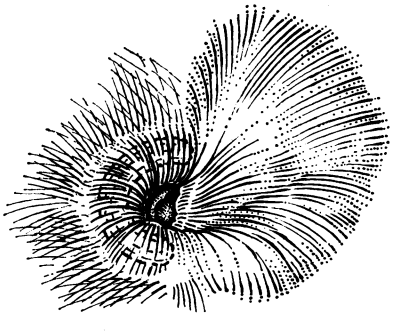

Fig 1 *Following section of sphincter muscles, wound has healed with much secondary epithelium and underlying scar tissue. Sphincters have retracted to about half their circumference*

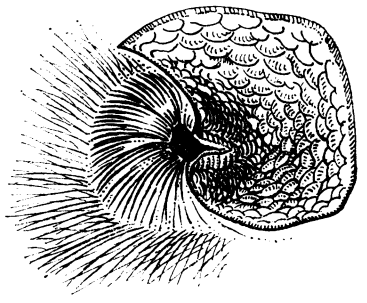

Fig 2 *Excision of secondary epithelium and underlying scar tissue. This must be taken right up into the anal canal itself*

Fig 3 *Reconstruction of epithelial lining of anal canal*

normal mucosa of the anal canal and lower rectum by dissecting about 1 cm of it free from the muscle wall. This will allow mucosal reconstruction to be performed without tension.

The muscle ends are then sought, and here the greatest judgment is needed. They are not difficult to find but if they are cleaned of all fibrous tissue any sutures put in will tear out, as Goligher indeed remarked. Our aim is to find the ends but to leave on them a good deal of fibrous tissue which will hold the stitches. No attempt is usually made to identify separately the internal and external sphincters. It is necessary to dissect on the lateral surface of the sphincters for a short way to free them of any fibrous tissue that may have formed in the ischiorectal fossa and may be tethering the muscles laterally. On the other hand, too extensive clearance may put the blood supply of the ends in jeopardy.

The repair is not difficult. The mucosal tube is first reconstructed with a continuous stitch of 2/0 chromic catgut (Fig 3). The fibromuscular tissue representing the sphincter ends is then overlapped to make a snug sphincter ring (Fig 4). 40 SGW stainless steel wire is used as this causes minimal tissue softening and will not result in a persistent stitch infection. Horizontal mattress sutures are used and it is important not to tie them tightly or the muscle will necrose. No attempt is made to suture the perineal skin as this cannot usually be done without creating undue tension. A large open wound is left at the end but even though muscles are exposed in the base it heals rapidly.

Results

For purposes of assessment the patients have been divided into two main groups, those with anterior injuries and those with lateral injuries. It is generally agreed that anterior muscle section can be treated with relatively good results, probably because the puborectalis sling is always intact in this group and it only requires a bar of fibrous tissue in front of the anal canal for reasonable sphincteric action to occur. In lateral and posterior injuries, however, the puborectalis also is divided so that all the muscles of continence are cut and must be repaired.

Of the 8 patients with anterior injuries all had universally good results apart from the one who refused a temporary fæcal diversion and who also had Crohn's disease. This is despite the fact that 3 of those with late sequelæ of birth injury had

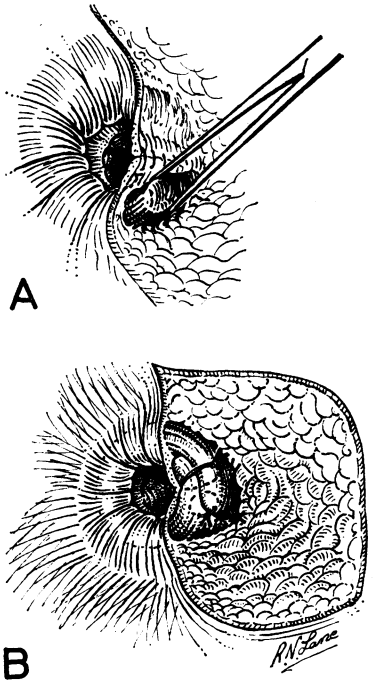

Fig 4 *Steps in reconstituting muscle ring. Fibrous tissue attached to ends of divided sphincter is carefully preserved.* A, *muscle is mobilized by dividing fibrous tissue attachments which bind it to fat of ischiorectal fossa.* B, *muscles are overlapped and lightly sutured with fine stainless steel wire*

previously had an unsuccessful gynæcological repair.

Of the 12 with lateral or posterior injuries, 11 have been functionally assessed. There was one total failure, the patient who refused a temporary colostomy and whose wound broke down. The remaining 10 had excellent results. Two have some loss of control of flatus but regard this as a trivial inconvenience.

Objective assessment of sphincter activity was made on 4 patients by means of yield pressure measurements carried out with an open tube constant infusion technique. Most normal people can develop a pressure above 50 cm water; those who cannot attain this level have some degree of incontinence. The 4 patients tested after operation developed pressures of 85, 70, 125 and 85 cm water respectively.

Conclusion

Sphincter repair following muscle section, whatever the cause, can be satisfactorily performed provided a temporary colostomy is established. The functional results have been excellent in 18 cases, 11 of which were lateral or posterior repairs. None of those whose repair followed fistula surgery have developed recurrent fistula so far.

REFERENCES
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Continence and the Yield Pressure of the Anus [*Abridged*]

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Normal fæcal continence has been defined as the ability to retain fæces until its delivery is convenient (Gaston 1948).

Following operations for anorectal anomalies a number of patients are 'incontinent' in spite of an apparently reasonable levator sling and a good voluntary sphincter grip as assessed by digital examination.

A simple device based on that of Gryboski *et al.* (1968) has been used to measure the compliance of the anal canal – i.e. the resistance to stretch or, alternatively, the force required to open it. This is mainly a measure of internal sphincter tone.

Material and method: Seventy-four patients, 14 of less than 1 year, 49 between 1 and 9 years and 11 between 10 and 17 years of age, were tested. Hirschsprung's disease was present in 17 patients, imperforate anus in 17, neurogenic disorder in 16, extrophy of the bladder in 3 and chronic constipation in 12; there were 10 controls.

A 2 mm diameter probe bearing a small balloon was inserted, with the balloon deflated, so that the shoulder of the balloon was just out of view in the anal canal. Using a tuberculin syringe, 0·05 ml increments of air were inserted at 2 second intervals. A continuous record of pressure was made, using a flush diaphragm pressure transducer and an Offner-T recorder. This procedure was then repeated several times at this and other levels. A pressure calibration of the probe was made before and after each study.

In most cases anal canal resting and voluntary squeeze pressures were also recorded using a probe described by Lawson & Nixon (1967), and a clinical assessment of 'sphincter tone' by digital examination of the anal canal was carried out.

Observations: With initial increments there is usually a stepwise increase in pressure, followed by a plateau with the pressure remaining relatively constant for several increments. At this point the volume of the balloon must obviously be increasing and, therefore, the anal canal yielding – this plateau is deemed to represent the yield pressure.

Results: Table 1 shows the pressures recorded in 74 patients and relates these to the extent of soiling. In the 15 patients who had persistent soiling there was a far closer correlation with a low yield pressure than with the other two parameters of anal canal pressure measured; 11 of these patients had a yield pressure of less than 25 and only one exceeded 50 cm water. However, about half of these showed a normal resting and/or maximal anal canal pressure by our standards. Of the 'moderate soilers' the yield pressure was less than 25 cm water in 9 of the 14

Table 1
Soiling compared to anal canal pressures in 74 patients

			Occasional soiling		
Pressures	*Pressure range cmH₂O*	*Persistent soiling*	*When constipated*	*When loose stools*	*Clean*
Yield	0–25	11	–	9	–
	30–45	3	1	2	2
	⩾50	1	7	3	35
Resting	0–30	7	–	7	1
	40–60	5	4	6	15
	⩾70	2	4	1	13
Maximum squeeze	0–35	3	–	1	–
	55–90	4	1	9	3
	⩾100	8	7	4	34
Total no. patients		15	8	14	37